METAL WOOD GOLF CLUB HEAD

FIELD OF THE INVENTION

The present invention relates generally to a metallic hollow golf club head, and specifically, to the placement of a stamped insert into the face of the club. This invention is also directed to a weight element being located on the sole in the heel/skirt regions of the club.

BACKGROUND OF THE INVENTION

Golf club "metal woods", were originally manufactured primarily by casting of durable metals such as stainless steel, aluminum, beryllium copper, etc. into a unitary structure comprising of a metal body, face and hosel. As technology progressed it became more desirable to strengthen the face of the club, and usually this was achieved by using a titanium material.

With a high percentage of amateur golfers constantly searching for more distance on their drives, the golf industry has responded by providing golf clubs specifically designed with distance in mind. The head sizes have increased which allows for the club to possess a higher moment of inertia, which translates to a greater ability to resist twisting on off-center hits. As a wood head becomes larger, its center of gravity will be moved back away from the face resulting in hits flying higher than expected. Reducing the lofts of the larger head clubs can compensate for this. Also the larger heads, because the center of gravity is moved further away from hosel axis, can cause these clubs to remain open on contact, thereby inducing a "slice" effect (in the case of a right-handed golfer the ball deviates to the right). Offsetting the head and incorporating a hook face angle can help compensate for this by "squaring" the face at impact, but often more is required to eliminate the "slice" tendency. The present invention provides such a solution.

Another technological breakthrough in recent years towards providing the average golfer with more distance is to make larger head clubs, while keeping the weight constant

or even lighter, by casting consistently thinner shell thickness and going to lighter materials such as titanium. Also the face of the clubs have been steadily becoming extremely thin. The thinner face will maximize what is known as the COR (Coefficient of Restitution). The more a face rebounds upon impact, the more energy that may be imparted to the ball, thereby increasing distance.

In order to make the faces thinner, manufacturers have moved to a forged or stamped metal face which are stronger than cast faces. Common practice is to attach the forged or stamped metal face by welding them to the body at the sole and crown junctions. The present invention provides a novel method for attaching an impact face to the club without sacrificing any COR (Coefficient of Restitution) value in the club.

The prior art teaches methods to enhance the weight distribution of metal woods to help reduce the club from being open on contact with the ball. Usually, this is accomplished by the addition of weights to the body casting itself or strategically adding a weight element at some point in the club. Many efforts have been made to incorporate weight elements into the metal wood head. They are usually placed at specific locations, which will have a positive influence on the flight of the ball or to overcome a particular golfer's shortcomings. As previously stated, a major problem area of the higher handicap golfer is the tendency to "slice" which besides deviating the ball to the right, also imparts a greater spin to the ball. To reduce this tendency, the present patent teaches the placing of a weight element directly into the club head. The placement of the weight is designed so that the spin of the ball will be reduced, and also a "draw" (a right to left ball flight for a right-handed golfer) will be facilitated into the ball flight. This ball flight pattern is also designed to help the distance challenged golfer because a lower spinning ball will generally roll a greater distance after hitting the ground than it would roll with a higher spin. The present invention provides such a golf club.

Several patents have been issued which are directed towards using an insert in the face of the club to increase the strength therein. One such patent, U.S. Patent No. 5,344,140 issued to Anderson, cites a face plate of forged metal.

None of the above inventions and patents, either singly or in combination, is seen to describe the instant invention as claimed.

SUMMARY OF THE INVENTION

In accordance with one aspect of the invention, a metal wood golf club head is provided which includes a hollow body having a stamped metal impact face welded to it. The body is preferably cast as a single member and includes an inner cavity surrounded by a sole plate, a crown portion, a toe portion, a heel portion, a skirt portion and a face perimeter forming an oval opening. The present invention utilizes a sheet metal insert that is preferably placed into the face approximately 0.20" removed from the crown portion and 0.20" removed from the sole plate. The face insert should be at least 0.15" from either the crown portion or the sole plate. The shell of the face perimeter is preferably of uniform thickness and less than the thickness of the insert. The insert preferably has a thickness that varies based on a double radii method that is described later.

In accordance with another aspect of the invention, the club head includes the addition of a weight element to the sole plate. The purpose of this weight addition is to reduce the tendency of a golfer to slice and to lower the spin rate of the ball, which actually tends to increase distance. The weight element is centered substantially on a projection extending away from and generally perpendicular to the impact face on a line through a point where the shaft centerline would meet the sole plate. The center of gravity of the weight element is thus substantially directly behind the point where the hosel axis intersects the sole plate. Preferably, the weight element is placed at a juncture of the heel/skirt portions of the sole plate. The weight element may be either cast with the body or can be a separate piece attached to the sole plate by conventional means such as welding. The center of the weight element should be at least 1.0" and preferably more than 1.5" from the intersection point of the hosel centerline and the sole plate. It is anticipated that the weight element be greater than 12 grams and more preferably greater than 16 grams.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of the present invention showing cut out section and stamped metal insert.

FIG. **2** is a side view of the impact insert of FIG. 1.

FIG. **3** is a partial top view showing the intersection point where the centerline of the hosel meets the sole plate.

FIG. **4** is a partial cross-sectional side view of a golf club head with a face having a different interior and exterior vertical roll radii.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIGS. 1-5, showing the first embodiment of the present invention, there is provided a golf club head **10**, which is integrally formed by welding and combining the edges of a body **11** with an impact insert **12** so as to form a cavity **13** therein. The body **11** includes a crown portion **14**, a sole plate **15**, a heel portion **16**, a toe portion **17**, a skirt portion **18** and a face perimeter **19**. Body **11** can be formed of sheets welded together or cast, preferably from a titanium alloy. The body also includes a hosel **20** that extends from heel portion **16**. Hosel **20** includes a bore defining a centerline axis **A-A.**

An opening **21**, that in one embodiment is substantially oval shaped, is defined within face perimeter **19** for receiving impact insert **12**. A plurality of chads **22,** being in alignment with an inner surface **23** of body **11** provide a pocket within opening **21** for receiving the impact insert **12** which is therein integrally connected by welding. Insert **12** is preferably formed of high strength material and can be cast, forged or stamped sheet metal. Most preferably the insert is stamped sheet metal, and for one embodiment preferably made from a titanium alloy.

The thickness of the impact insert **12** should be preferably between about 0.05" and 0.13". The insert can be uniform thickness or have a thicker center section and thinner outer section. For a preferred embodiment the outer dimension (T_2) should be about 0.09" and the center dimension (T_3) should be approximately 0.10" controlled by a

technique described in co-pending Application No. 09/836,266. It's basically a technique wherein the impact insert **12** has two different radii of curvature. The exterior surface **24** being substantially defined along a first radius **R1** and the interior surface **25** being substantially defined along a second radius **R2**, such that the first radius **R1** is less than the second radius **R2**. The present invention further is adapted towards the face having a vertical roll radius: that being from crown **14** to sole **15.** This will allow insert **12** to have less thickness at the outer edge than at the center. The thickness of the impact insert **12** is viewed as a critical compromise between first, being able to achieve the desired "COR", and secondly, providing a club head that is strong enough to withstand the impact forces which occur during collision between club and ball.

In one embodiment of the present invention, the edges **27** of face perimeter **19** are as thin as possible, while still maintaining structural integrity. Preferably the thickness (T_1 at the sole/face transition junction **29** and T_4 at the crown/face transition junction **28**) is approximately the same and is less than 0.11 inches. More preferably, they are less than 0.09 inches and most preferably approximately 0.08" for maximum COR values.

In a preferred embodiment of the present invention, the body **11** includes a face perimeter section **19** that extends from the crown portion **14** over a distance (denoted as $\Delta 1$ in the drawings), of at least about 0.15 inches, and also over a distance of about 0.15 inches from the sole plate **15** ($\Delta 2$ in drawings). The welds **30** of impact insert **12** to body **11** will be conducted at a suitable distance from the transition junctions **28** and **29.** The dimensions of both $\Delta 1$ and $\Delta 2$ are preferably should not less than 0.20 inches. This construction allows for thin shell thickness at the crown/face transition junction **28** and sole/face transition junctions **29**. The thinness of these sections help increase the club head's COR value that extrapolates into greater distance.

In a second embodiment, the body **11** can still be cast from a titanium alloy, but the stamped impact insert **12** can be a stamped titanium alloy sheet metal. The thickness of the impact insert **12** for this embodiments can be a constant measurement of about 0.08 to 0.13 inches for T_1, T_2, T_3 and T_4.

For another embodiment, the body **11** and stamped impact insert can be manufactured out of stainless steel. Preferably, the head is more than 270 cubic centimeters and the body is cast and the insert is stamped sheet metal. The thickness of

the impact insert **12** for this embodiment is preferably a constant measurement of between about 0.075" to 0.105" for T_1, T_2, T_3 and T_4. In another embodiment the club head loft is greater than 13° and the inserts **12** have a constant thickness between about 0.05" to 0.09".

Another important design concept of the present invention is providing a weight element **26** located on the sole plate **15** approximately at the heel/skirt portions **16** and **18**. As shown in FIGS. 1 to 5, weight element **26** is preferably centered substantially on a projection **B--B** extending directly rearward from a point **(P)** on the sole plate where an extension of the center line **A--A** of hosel **20** would intersect the sole plate **15**. Preferably, the center of gravity of the weight element **26** is adjacent the juncture of the sole and skirt portions **16** and **18**. It is preferred that the center of weight element **26** be located at a distance **(D)** of at least 1.0" and more preferably at least 1.5" from the intersection point **P**. This is shown on FIG. 3. The weight element **26** is preferably at least 12 grams and more preferably at least 16 grams.

The weight element **26** can be part of the casting or preferably welded into position. More preferably, the weight element **26** is selected from a plurality of weights designed to make specific adjustments to the head weight.

While various descriptions of the present invention are described above, it should be understood that the various features of each embodiment can be used singly or in any combination thereof. Therefore, this invention is not to be limited to only the specifically preferred embodiments depicted herein. Further, it should be understood that variations and modifications within the spirit and scope of the invention may occur to those skilled in the art to which the invention pertains. Accordingly, all expedient modifications readily attainable by one versed in the art from the disclosure set forth herein that are within the scope and spirit of the present invention are to be included as further embodiments of the present invention. The scope of the present invention is accordingly defined as set forth in the appended claims.